The
Cane Growers' Quarterly
—Bulletin—

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Fibre in Cane.

By H. W. KERR.

THE price received by the canegrower for a ton of cane is inevitably governed by the quantity of sugar which it contains. Where the grower is paid directly on analysis this is determined by the mill chemist when the cane is delivered for crushing. Actually, it is the *cane juice* which is analysed, and the quantity of such juice in the cane is then calculated in accordance with the amount of fibre in the particular consignment.

The manner in which the last-named adjustment is made has probably been responsible for more contentious discussion than any other question which mutually affects grower and miller. *Firstly*, the method of selection and preparation of sample sticks for the fibre test has given rise to much contention. This has been very extensively investigated, and it may confidently be stated that the technique at present laid down by the regulations under the Sugar Cane Prices Acts, does assure that the fibre percentage as determined is as accurate as can reasonably be expected, when the sampling difficulties involved are appreciated. *Secondly*, it is recognised that, for a given variety, there exists normally a variation in fibre content between plant, ratoon and standover crops. It is therefore customary for the mill to determine periodical (usually weekly) fibre values for each class of each major cane variety, and to apply these average figures to the respective consignments of cane falling within each class. The farmer supplying a crop of well-grown cane will protest against the application of an average fibre figure which must certainly be inflated by the inclusion of cane from other lands which has been produced under adverse conditions, and he often claims that he is entitled to a fibre figure determined for his special parcel of cane. *Finally*, a wide variation occurs in the care with which growers prepare their cane for milling purposes. While some pay special attention to the topping of the stalks, and guard against any soil or trash being loaded on the trucks, other farmers give little heed to this important question. The miller naturally objects to paying cane prices for trash, roots and soil, and claims that these factors should be given due weight in arriving at a true basis of calculating from juice analysis to cane composition. Again, the grower supplying clean cane objects to being penalised for the careless farmer. Doubtless the cane-cutting gang is in a measure directly responsible for the quality of cane as supplied, but it is the farmer's duty to see that all conditions are rigidly observed in this respect.

It should, theoretically at least, not be a difficult matter to appease all parties in such disputes; but in practice, any attempt to meet the wishes of miller and grower in matters of detail would introduce so many complexities, that the cost of carrying the project into effect would probably more than outweigh any of the benefits secured.

With a view to assessing the possibilities of such a plan, a comprehensive series of investigations in fibre determination were commenced some three years ago. The results of these tests have been issued by the Bureau in two technical bulletins—one prepared in 1937, and the other which was published recently. Copies of both bulletins are available to any canegrower wishing to study the technical aspect of the problem, and the conclusions which may be drawn from the results obtained. For the present, it is proposed to present the major conclusions in a broad manner, so that farmers generally may be acquainted with the present status of the problem.

Results of Investigations.

1. Fibre Variation within the Stick.

The unit taken in preparing a sample of cane for the fibre test is, of course, the stick of cane. The Cane Prices Regulations set out the manner in which stick samples are to be taken, and sub-sampled for analytical purposes. It will be obvious, then, that the precision with which the average fibre content for a given variety and class of cane can be determined will be governed in the first place by the variation *within the stick* of cane. Tests have shown that, early in the season, the fibre is highest in the butt section of the stick, is sensibly uniform throughout the major portion of the length, and is slightly lower than the average in the top portion. As the crop matures, the normal sequence is for the fibre in the top section to rise, so that the butts and tops both give values higher than that for the mid-section.

2. Fibre Variation between Sticks.

When the values of the fibre for individual sticks are compared, it is found that there is a wide variation also from stick to stick, even when drawn from the same field of cane. On a test involving twenty-four sticks of P.O.J. 2878 ratoon cane, for example, the highest test was 13·3 per cent. and the lowest 9·9 per cent. This is characteristic of the variation experienced. In the mill, however, sample sticks are grouped for cane drawn from a *number* of fields. When parallel tests were carried out with cane sticks from different sources, it was found that the difference between extreme tests for individual sticks was even greater. Thus, for sticks of P.O.J. 213 from three fields, the extreme single-stick tests were 17·5 per cent. and 13·4 per cent. respectively.

When it is remembered that all of these tests were made on clean sticks of cane, uniformly topped, it will be realised that the selection of sufficient sticks from all consignments of a variety as usually delivered, to give a true average figure, involves no little trouble and time. Certainly these results bear out the contention that the cane from all farms does not conform with the average fibre figure awarded to them; thus two farmers harvesting P.O.J. 2878 at the same time were delivering crops with 11·9 and 9·8 per cent. average fibre respectively, while a

similar comparison for P.O.J. 213 gave values of 16·6 and 14·8 per cent. But, from what has been presented, the magnitude of the sampling and testing job will be appreciated, when it is realised that cane of one variety and class is being delivered daily from perhaps fifty or more farms; how could each expect to receive the true figure based on individual tests? An augmented laboratory staff would be fully engaged in this work alone.

3. Fibre Variation—Plant v. Ratoon v. Standover Cane.

The tests under discussion bore out the normal mill finding that ratoon cane shows, *on the average*, a higher fibre figure than plant cane. This is, of course, not uniformly true for all individual consignments, but is governed chiefly by the condition of the cane in question. Many fields of well-grown ratoon cane showed a lower fibre content than poorly grown plant cane of the same variety.

Standover cane is generally higher in fibre than one-year-old cane, whether plant or ratoon. This is to be expected, as the short "notches" of standover cane are very high in fibre, while age is also a factor contributing to woodiness.

4. Effect of Topping on Fibre Content.

In certain of the tests, sticks were topped "high," so as to show a well-defined "bull's eye." It was found, unexpectedly, that this added section often possessed a lower fibre content than the balance of the stick; in general, however, inclusion of the immature section increased the average fibre. It must be remembered, of course, that this is not a justification of the policy followed by some growers, in the expectation that it will prove profitable. Moreover, the tests here reported were carried out on freshly topped sticks. When such were dried out, as they usually are on arrival at the mill, it would be expected that the fibre would be markedly higher in the immature portion of the cane.

The Problem of Trash and Dirt.

Though it is concluded that the employment of any but average fibre figures in computing cane values would be impracticable, it does appear that something might be done to adjust the figure, according to the freedom or otherwise of the particular consignment from trash and other extraneous matter. That is, instead of attempting to include adhering trash in the material prepared for the fibre test, as is sometimes done, it is suggested that the test be made exclusively on clean cane, and a "correction" added to this figure to allow for the degree of impurities included on the trucks with the cane sticks. This at least would provide a well-merited bonus for the supplier of clean cane, and duly penalise the grower who is not so particular.

For this purpose it would be necessary to classify all cane on appearance, at the time of its discharge on to the carrier. Three classes are proposed—A. "Clean" cane, B. "Medium trashy" cane, and C. "Dirty" cane. The standards of cleanliness would, of course, vary from mill to mill, as would also the corrective factor to be applied.

As an example of the amounts of field trash bought by the miller as cane, the following are the average figures obtained from a large series of cane cleaning tests made at a number of Queensland mills last year:—

	Extraneous Matter. Per cent.
"Clean" cane	1·2
"Medium trashy" cane	2·0
"Dirty" cane	3·4

It is confidently suggested that the adoption of this proposal would result in a speedy improvement in the quality of the cane supply. Moreover, it would remove what has long been a contentious subject between miller and grower, as well as amongst growers themselves.

Prosecution for Breach of Disease Control Legislation.

Canegrowers, like everybody else, recognise the necessity for stringent action in the control of human diseases, which constitute a menace to the community. Similarly most canegrowers appreciate the need for prompt action in dealing with cane diseases, when their existence is a menace to the well-being of the sugar industry. The exercise of the powers conferred by the Act on officers of the Bureau staff is one which gives them no pleasure, and in carrying out their duties in this respect it is often necessary to place the farmer concerned at no little expense and inconvenience.

We are pleased to say that cane farmers generally give their wholehearted co-operation in our efforts, and this gives us cause for hoping that serious losses from disease will soon be a thing of the past. But occasionally one encounters a farmer who is not inbued with the spirit that he owes it to his neighbours, even if he is not interested for himself, to see that disease on his farm does not spread to their cane. Recently we had occasion to take proceedings against a farmer in the Bundaberg district who adopted this attitude despite every consideration shown to him by our officers. He was fined £3 and costs, but the Bureau did not press for a heavy penalty in this case.

It is sincerely hoped that it will not be necessary to take such extreme measures with any farmer in the future. This could certainly be avoided if all canegrowers would keep in mind the following points:—

(1) Cane diseases constitute a loss to everybody.

(2) Growers generally contribute much in time and money to controlling diseases which exist on their farms.

(3) The Disease Control Boards recently constituted will be called upon to spend quite an amount of farmers' money in disease eradication, and this cannot be expended wisely unless all canegrowers give a full measure of co-operation.

(4) If disease spread is not checked and brought under control, the present valuable standard canes must be struck off the approved lists, and growers will be obliged to plant varieties of inferior quality.

H.W.K.

Sampling Soils for Analysis.

Canegrowers are reminded that between July and October is the correct time at which to sample their soils for analytical purposes. As pointed out in the October, 1938, Bulletin, analytical results and advice based thereon are most valuable when soil sampling is confined each year to blocks carrying mature crops of plant cane. All samples should be truly representative of the soil of the block; portions should, therefore, be taken at several locations, to plough depth, and carefully mixed to give one sample for the entire field.

Should the farmer desire it, the local Field Officer of the Bureau will be pleased to call, on request, and attend to the taking of the sample and its despatch to our laboratory. Alternatively, the farmer should send the parcel of soil which he has taken to—

The Director,
Bureau of Sugar Experiment Stations,
Department of Agriculture,
Brisbane,

being careful that his name is included as well as identification marks if more than one sample is despatched.

Farmers in areas north of Townsville may despatch their samples to the Sugar Experiment Station, Gordonvale, where they will receive prompt attention.

H.W.K.

The Lasting Effects of Molasses used as Fertilizer.

By C. G. STORY.

MOLASSES as a fertilizer has a particular value on potash-poor red volcanic soils, because of the richness of the by-product in this plant food. But it has also been found that molasses applied to such soils, in dry areas, also brings with it another benefit, particularly when weak-rooting canes such as Q. 813 are grown. It would appear that the molasses destroys the influence of root parasites which often exist under such conditions, and the weak-rooting cane gives a normal ratoon yield.

The results of an application of molasses to a ratoon field of Q. 813 in the Woongarra area were reported in the Quarterly Bulletin of January, 1939, page 121. The yield figures are particularly interesting, and should be studied by all farmers on soil of this type. It was concluded that an application of 5 tons of molasses, together with mixed fertilizer supplying an equal amount of plant-foods, was better than 10 tons of molasses alone.

After this crop of cane had been harvested, the farmer ploughed out the area, and broadcast Poona pea as a cover crop, in October last. Particular notice was taken of the growth of the pea crop to see whether the molasses treatment showed any "carry-over" effect. In every instance it was found that the growth of the legume on the plots which had received 10 tons of molasses a year earlier was far in advance of that on the "no treatment" plots. A comparison of the respective growths is illustrated in Fig. 1, the photograph was taken in January, three months after planting. During this growth period seven inches of rain had fallen.

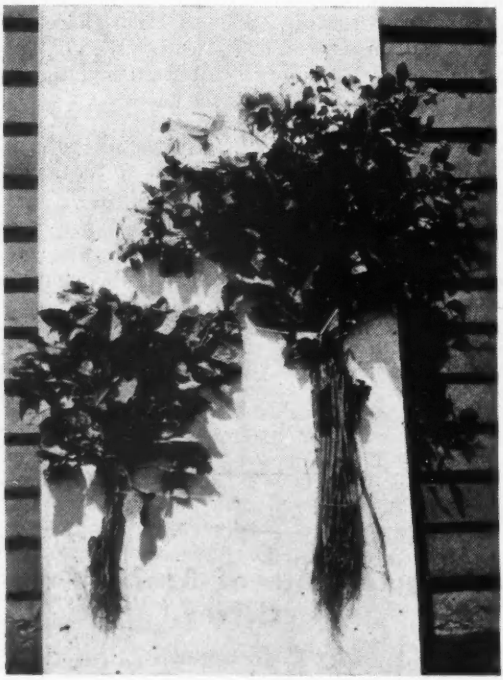

FIG. 1.—Illustrating the lasting effects of an application of molasses. Its influence is shown on a crop of Poona pea planted after the ratoons were ploughed out. *Left*, plant from "no molasses" plot; *right*, plant from "molasses" plot.

The benefits enjoyed by the pea crop growth can probably be credited to the abundant supply of potash provided by the molasses, which was not entirely used up by the ratoon cane. It can be expected, of course, that the effect will be seen also in the next crop of cane which is to be planted on the field this year. Therefore, in calculating the value of any beneficial soil treatment, the farmer should consider not only immediate results, but allow also for the more permanent effects as well. On the trial in question, the Q. 813 ratoons showed a gain of 6½ tons of cane per acre where 10 tons of molasses per acre were applied.

Approved and Non-approved Varieties.

By H. W. KERR.

IN March last the Bureau issued a "Concise Statement" setting out the major features of the recent Amendment to the Sugar Experiment Stations Acts. Particular attention was devoted to the matter of approved and non-approved varieties, but apparently there are still many growers who are not clear regarding their obligation under the present Acts. As this is a matter of considerable importance, farmers generally should give special attention to the following:—

1. Approved Varieties.—For 1939, and in future years, the approved varieties are contained in a list prepared and issued by the Director of Sugar Experiment Stations. This list is not subject to any modification whatsoever, and remains in force until the next annual list is gazetted. **All other varieties of cane are disapproved, and farmers will not be able to harvest them for milling purposes. They must be ploughed out and destroyed.** This point is most important. Growers should no longer regard any lists published in Local or Central Board Awards as representing the canes which may be planted for future harvest. Such lists can apply only to the canes which are approved for 1939 harvesting.

2. Approved Varieties, which are Subsequently Disapproved.—In certain cases a variety which is approved for planting in the year 1939, for example, may be disapproved in a subsequent year. In this event, the farmer is permitted to grow and harvest the cane during the three calendar years following the calendar year of planting. That is, if he plants the cane during 1939, he may continue to grow it during 1940, 1941, and 1942, but it must then be ploughed out.

3. Experimental Varieties.—Non-approved canes which are grown for experimental purposes for and on behalf of the Bureau, or the planting of which is specifically authorised by the Director, will be treated as approved varieties. This refers only to the specified plots, and does not permit the farmer to grow the canes where and how he wishes.

4. Canes for Fodder Purposes.—If any person in a mill area wishes to grow, for fodder purposes, any cane other than an approved variety, he can select only from such list of "approved fodder canes" as is specially proclaimed for his area. The preparation of such lists is now in hand, and will be given publicity following gazettal.

Disapproved Varieties.

Many farmers have at the present time fields of cane which at the time they were planted were disapproved varieties. This refers to cane planted before the 1939 Approved Variety list was issued. **It should be noted carefully that such fields may be harvested during 1939,** and the fields must then be **ploughed out.**

Perhaps this is where the difficulty of many farmers lies. The provision for harvesting disapproved varieties refers only to the year 1939, and in future years the miller will be forced, under heavy penalty, to refuse acceptance of any disapproved canes for milling purposes.

Deduction from the Price Payable for Approved Varieties.

An amendment to section 20 (4) of *"The Regulation of Sugar Cane Prices Acts,* 1915 *to* 1936," now provides for a deduction from the price payable for **approved varieties**. This is permissible in the case of (*a*) canes certified by the Advisory Board to possess a material milling disability, or (*b*) canes which are not included in a limited number of the varieties approved by the Director, such limited number to be agreed upon in a prescribed manner, by the canegrowers whose lands are assigned to the mill.

Part (*b*) of this amendment seems to cause some misunderstanding amongst growers. The position is that any grower in any mill area may plant any variety of cane contained in the "approved" list for his mill area or section of the mill area. But if the growers supplying cane to that mill agree, in a manner to be prescribed by regulation, that they wish a restriction to be placed on the planting of certain varieties, they may decide that a deduction not exceeding 10s. per ton may be made by the miller.

Odd Stools of Disapproved Varieties in Fields of Approved Canes.

Farmers often adopt the expedient of using quick-striking varieties as "supplies" in blocks where the original strike was poor. In many cases which have been brought before our notice, the farmer has utilized plants of a disapproved variety for the purpose. It should be noted that such stools must be treated in a manner similar to that prescribed for fields of disapproved canes. They must be dug out and destroyed after the crop is harvested this year.

Variety control (which generally means the same thing as disease control) can only be effective where every single stool of the disapproved cane has been eliminated. Many cases of what are now serious disease outbreaks can be traced to the existence of odd stools of old disapproved canes which the farmer did not consider it necessary to destroy.

Bound Copies of Quarterly Bulletin, Vols. V-VI.

Volume VI. of the *"Cane Growers' Quarterly Bulletin"* is now complete, and in accordance with past practice, it is proposed to have Volumes V. and VI. bound in a cloth cover. We are forced to restrict the number of bound copies, and any canegrower or growers' organisation desirous of obtaining such a copy is requested to make application to the Director, Bureau of Sugar Experiment Stations, Brisbane, as early as possible. Applications should be accompanied by a postal note for the sum of 2s. 6d., which is the nominal charge for the bound volume.

Orders will be received until the 31st August next, and only those persons whose applications are in hand at that time can participate in the offer.

H.W.K.

Cane Variety Returns.

Early this year all cane growers were supplied with two copies of a form on which they were required to enter the area of each variety planted on and harvested from their farms during the year 1938. This is in accordance with the 1938 Amendment of the Sugar Experiment Stations Acts, and a similar procedure will be followed in future years.

The completed returns must be despatched to the mill before a prescribed date, and the miller is then required to submit one copy of each return to the Bureau.

While making due allowance for the fact that this is the first occasion on which such a return has been required, it is felt that many growers could assist the miller and the Bureau more effectively in the future. We would therefore urge all cane farmers to maintain careful records of—(1) the area of each variety planted during the calendar year; (2) the area of each variety harvested; (3) the **total** area cut for plants (either for his own use or for sale purposes); and (4) the **total** area cut for fodder purposes.

In order that the farmer may have a copy of the return to keep for himself, three forms will be issued in the future, two of which must be signed and returned to the mill. In addition, self-addressed envelopes will be included to facilitate the despatch of the returns to the manager of the mill.

It should not be necessary to point out that a penalty is prescribed for any farmer failing to deal promptly with this matter in the future. We feel sure however, that all growers will deal with the matter promptly, so that any unpleasantness of this nature may be avoided.

H.W.K.

Trials with Gambia Pea.

By H. W. KERR.

IN recent issues of the *Bulletin* reference has been made to the promise shown by a species of Crotalaria—which we have called "Gambia pea"—as a long fallow green manure crop. During the past summer the small quantity of available seed was allotted to the planting of small plots on selected farms in a number of the major cane growing areas. The seed was not of specially high quality, as much of it had been gathered at the Bundaberg Station during showery weather and mould damage was considerable. Allowance was made for this defect in seeding the trial areas, but in practically all cases a good stand was obtained.

The seed is very small, being appreciably smaller than the Poona pea; if an even broadcast could be assured, less than 10 lb. would seed an acre of land. Our experiences were that it germinated rapidly where soil moisture was favourable. It soon became established but thereafter followed a period during which the young plants appeared to "hang fire," while weeds and grasses threatened to choke out the young crop.

However, the pea suddenly displayed a vigour of growth which was remarkable: by February (3 months after planting) it had attained a height of over 5 feet in certain plots, without showing any signs of flowering. Where the seeding had been heavy, and the individual plants were overcrowded, the growth was almost entirely confined to a single stem with few small branches. But where space permitted, the plants branched profusely, and in all cases provided an excellent cover (*see* Figs. 2-4.)

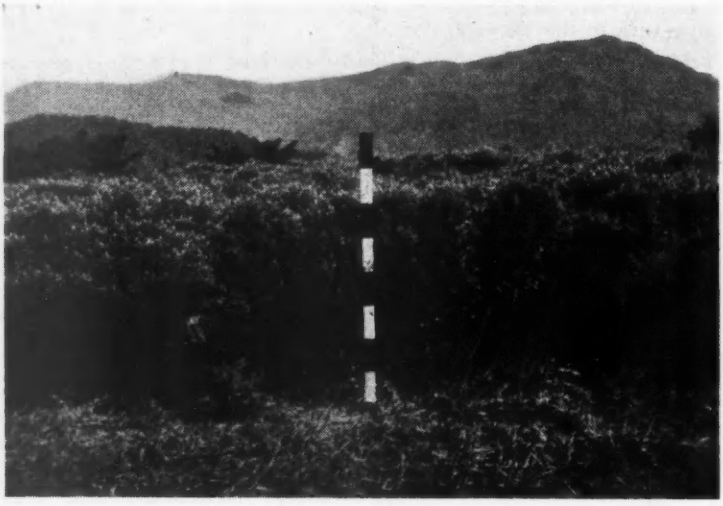

FIG. 2.—A good crop of Gambia pea at the Meringa Station, five months' old.

FIG. 3.—Another crop of Gambia pea on the farm of Mr. A. H. Reichardt, Silkwood.

By April the pea plants on some of the trial plots were 7 feet high and seeding. The seed pods are short and thick, and are arranged in clusters at the upper extremity of the main stem. Normally the crop would be ploughed under before this stage; but we are attempting to save as much seed as it is possible to obtain, in order that a more extensive distribution may be made during the coming spring. However, even at this stage the main stems were not so excessively woody that they would not decompose at a reasonable rate when ploughed under.

FIG. 4.—An excellent crop of Gambia pea on Mr. T. Chappell's farm, South Isis. It yielded 25 tons of green matter per acre.

Sections of the crop were cut off at ground level on several of the plots, and the weight of green matter per acre estimated. Samples of the material were later dried and analysed for nitrogen content. Results of some of the yields and analyses are shown in Table I.

TABLE I.

YIELDS AND COMPOSITION OF GAMBIA PEA CROP.

Location.	Weight of Green Matter per Acre.	Nitrogen Content of Green Matter.	Equivalent to Sulphate of Ammonia per Acre.
	Tons.	%	Lb.
Meringa	24·0	..	..
South Johnstone	23·2	0·40	980
Childers	24·6*	0·49	1,260*

* In addition, leaf mould which had fallen from the plants provided further 1¾ tons per acre (dry).

The influence of such a body of material on the fertility and humus content of the soil will be readily appreciated. Certainly the plant cane which follows should find in the soil an abundance of available nitrogen for its full requirements. It will be borne in mind that the major

portion of this nitrogen (equivalent in one case to over 260 lb. of sulphate of ammonia per acre), was gathered from the air by the root nodule bacteria associated with this legume, and represents a net gain to the soil. The roots of all plants which were examined carried clusters of well-formed nodules, although no steps had been taken to inoculate the seed before sowing.

It is well recognised that Gambia pea possesses pronounced drought resisting qualities, and in this respect should be specially valuable for spring planting in the Queensland cane areas. Moreover, it is found that when cut off near ground level at a certain stage of growth, it will ratoon strongly and provide a further crop without the necessity for re-seeding. This is a particularly valuable point, for it suggests that the species is ideally suited for long fallowing purposes. With the introduction of rigid production control in all districts, many farmers will find that they have excess areas which could well be treated to say —18 months fallow. If such a policy were regularly practised as each block is ploughed out, and leguminous cover crops retained on the land throughout the resting period, the fertility of the soil would be speedily built up. Further, it would be found that substantial savings could be effected in the purchases of artificial manures; following such a fallow, the plant crop of cane may require little if any fertilizer, and ratoons only would require this treatment.

Finally, it should be pointed out that the blocks selected for the trial plantings represented a fair range of soil types, and were not confined to the better lands. On one dry red volcanic soil farm, the grower broadcast the seed on what he considers the poorest block on the farm. A heavy crop resulted—up to 6 feet in height—and the cover was excellent.

Cultivation of Cane for Fodder Purposes.

The amended "Sugar Experiment Stations Act" provides that within a mill area only approved varieties of sugar-cane may be planted, whatever the purpose for which the cane is intended. In this case growers are reminded that a mill area comprises all the land, whether assigned or not, within the general area over which the assigned land is distributed.

Lists of approved varieties for each mill area have already been issued and given due publicity. In addition, however, the Act provides that the Governor in Council may gazette varieties of cane which may be grown for fodder purposes, and it is proposed to gazette such varieties in the near future.

Accordingly it is asked that all persons who desire to plant for fodder purposes any variety of cane not otherwise approved for planting in their particular mill area, should communicate immediately with the Director, Bureau of Sugar Experiment Stations, Brisbane, giving the mill area and the variety it is desired to plant.

It should be pointed out that owing to the Fiji disease situation in Southern Queensland no canes of the Uba type will be approved for fodder purposes within a mill area in those parts.

H.W.K.

The Development and Value of Irrigation in Southern Queensland.

By C. G. STORY.

IRRIGATION water has aptly been termed "the lifeblood of the plantation," especially when sugar-cane is the crop concerned, as this is a crop which will literally grow in proportion to the water supplied to it when the mean air temperature ranges above 70 deg. The sub-tropical southern area, with an annual average rainfall of 44 inches, is highly dependent on the providence of nature if favourable crops are to be produced, as was shown by the disastrous season experienced in 1931-32. The realisation that irrigation is one of the safest insurances a farmer can have if he wishes to be certain of a favourable crop every year, is gaining in the south, where even under the conditions existing during the last two years, the rainfall, although plentiful, has been late, and due to dry checks experienced in late spring and early summer, when temperatures were admirable for growth, many tons of cane have been lost under dry farming conditions, due both to checking of growth in the young cane, and loss in standover crops.

This loss demonstrates clearly that irrigation is practically essential to this area if production, as warranted by the soil and varieties, is to be obtained. Taking a case in support of this, the South Kalkie area was, a few years ago, an area from which the mill could not be assured of a reasonable crop, but to-day the opposite situation prevails, due to the fact that the district is fast becoming an irrigation centre with a high farm average of cane per acre, with the present day varieties.

The results achieved by the large plantations prove conclusively that irrigation may be successfully conducted on a range of soils in the southern area. These plantations, which differ in the method of obtaining their water supply, have carried out a considerable amount of experimental work on irrigation, and have set a high standard for irrigation practice.

Excluding plantations, there are upwards of ninety irrigation plants in the Southern district, a large proportion of these being in the Millaquin area. The following may prove of interest as showng the distribution of plants in some of the mill areas:—

Millaquin area	45 irrigation plants.
Qunaba area	5 irrigation plants.
Fairymead area	5 irrigation plants.
Isis area	3 irrigation plants.
Bauple area	5 irrigation plants.

In the Bingera area upwards of thirty farmers use irrigation.

Most of the irrigation plants in the south are located on forest lands, on which are very often available large supplies of good quality water at shallow depths. Further, this particular type of soil possesses another advantage with irrigation, as it generally gives good returns from applications of sulphate of ammonia and mixed fertilizer rich in superphosphate, which fertilizer materials are generally less costly than those necessary for volcanic loams.

Just as soil types in the south vary, so does the quality of water found in the areas embraced by these soil types. Waters obtained on the red volcanic soil area are, on the whole, unsuitable from an irrigation point of view, as very few samples show an analysis below 50 grains of salt per gallon, and some are as high as 400. Up to 100 grains per gallon is considered safe, but the use of any thing over this figure might give rise to trouble. At the Southern Sugar Experiment Station the bore water contains only 3 grains of salt per gallon, and is therefore excellent quality for irrigation purposes. Unfortunately for most of the Woongarra area, large supplies of underground water suitable for irrigation purposes are apparently not available at pumping costs which would be economical.

Analyses of waters from forest lands show that the salt content varies from 3-15 grains per gallon with an average of 7 or 8 grains per gallon. The water found below old alluvial country by one of the plantations in the Bundaberg district is, on analysis, suitable for irrigation.

Waters in the Bauple area generally contain an excessive proportion of magnesium salts which in time may have a deleterious effect on the soil, if not corrected by suitable soil treatment. The same remarks as apply to the red volcanic soils of Bundaberg apply also to those of the Isis area.

The soil is the reservoir in which is stored the water which falls as rain or is applied as irrigation. Different soils vary in their water retentive capacity, while they also differ in the proportion which they can yield up to the crop for growth purposes. The difference between the water content of a well-drained soil and that present when the crop can extract no more moisture from the land (the so-called "*wilting point*") is a measure of the available moisture for the particular soil. This is demonstrated by the following figures:—

	Maximum Field Capacity. Per cent.	At Wilting Point. Per cent.	Amount Available. Per cent.
Red volcanic loam..	30	20	10
Red forest loam ..	24	12	12

From these figures it is seen that a soil may still be holding a large amount of moisture, but it is not available for plant growth. The red volcanic soil has the higher water holding capacity, but cane on this soil type will cease growth before that on the red forest.

Growth measurements on canes grown on the red volcanic soil have shown that the crop receives a definite check in growth ten days after a liberal fall of rain, when conditions were otherwise favourable for growth; so that heavy irrigations at ten day intervals, or shorter periods, would be necessary on this type of soil if crop growth is to be maintained continuously under summer conditions.

Although the moisture available for growth may be 10 per cent. of the weight of soil, other factors, such as evaporation from the soil surface, contribute to further losses. Windy conditions during the hot months of the year have a very distressing effect on crops under unirrigated conditions, as they increase evaporation both from the plant and the soil.

The results which have been obtained from red volcanic lands under irrigated conditions, speak for themselves. Growth measurements carried out on this type of soil adequately fertilized and irrigated have shown stalk elongations of 7 inches and more per week during the hot summer months, when the mean temperature of the air has been over 75 deg. The forest soils, which constitute the larger part of the irrigated area, may, and do, produce heavy crops of cane under irrigation as will be shown later.

P.O.J. 2878, the "Wonder Cane" of the southern areas, is a most suitable irrigation cane, and some excellent crops results are obtained with it when adequately fertilized, both as standover and 12 months crops. On irrigated farms, it appears general that 65-70 ton yields per acre may be produced economically in two years.

P.O.J. 2725 is another excellent irrigation cane for the south, although apparently few farmers have so far given this cane a worthy trial. On the Experiment Station under irrigation conditions it outyielded P.O.J. 2878 both on frosted and non-frosted plots by 12·5 tons per acre. Admittedly the cane arrows, and would in that case not be suitable for standover; but that is no reason why it should not be grown as a March plant, and 12 months ratoon cane, as excellent results have been obtained with this variety under these conditions on the red forest soils. As examples of the results which are obtained with P.O.J. 2725, the following figures are presented:—

Season.	Class of Cane.	Age when Cut.	Yield per Acre.	C.C.S. in Cane.
		Months.	Tons.	%
1937	March plant	18	75	14·7
1938	First ratoon	12	42	14·4
1938	February plant	20	82	14·4

All crops were fertilized at the rate of 7 cwt. per acre, of which 4 cwt. was sulphate of ammonia.

One distinct advantage which P.O.J. 2725 has over P.O.J. 2878 is its better resistance to downy mildew. This is a matter of considerable importance in the Bundaberg area at the present time.

While good results are obtained from the use of fertilizer in the south, provided rain falls, under irrigation it is absolutely necessary if heavy crops are to be harvested, and the fertility of the soil is to be maintained. One point which should be borne clearly in mind by farmers irrigating is that they should apply heavier applications than are used in general farm practice, especially in the case of sulphate of ammonia, which will provide big crop increases under irrigation conditions.

The Isis, a district of red volcanic soil with forest soil on the fringes, is an area which is virtually entirely dependent on rainfall to produce a crop. There are very few irrigation plants in the Isis, but the farmers who are fortunate to have them are to be commended on their enterprise in attempting to place their crops beyond the range of

climatic conditions. One plant in particular in this area, belonging to Mr. M. Brand, Cordalba, is worthy of special mention because of the difficulties which have had to be overcome to get the water to the farm. The supply is obtained from a site on Woco Creek, and the plant consists of a 57 B.H.P. crude oil engine driving a 4-inch, 4-stage centrifugal pump, the capacity of which is slightly over 20,000 gallons per hour. This large engine is necessary as the water is pumped through 1½ miles of 6-inch pipe line, traversing undulating country; it includes the crossing of several gullies and one creek, over which a framework had to be erected to carry the pipeline. The water is delivered into a dam at the highest point of the farm, and can also be taken off at various points along the pipeline. Sixteen hours of direct pumping on to the field from these points is the general practice; during the remaining eight hours the water is discharged into the dam which has a capacity of 250,000 gallons.

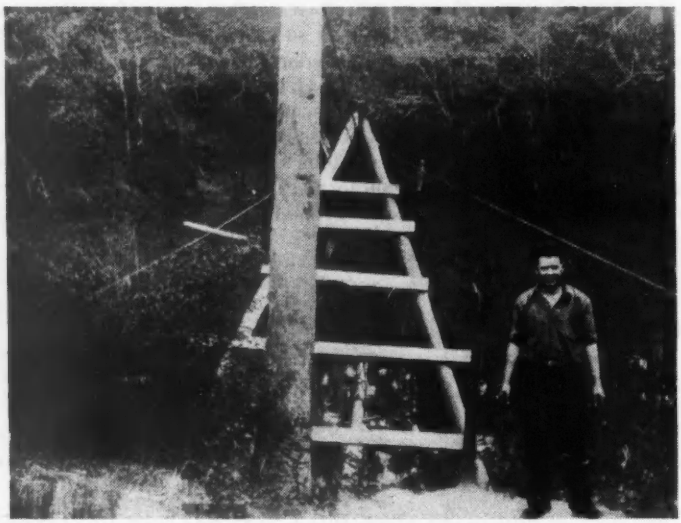

FIG. 5.—Showing the hole in Woco Creek, from which irrigation water is pumped by Mr. M. Brand.

The plant on this property is not being used to produce record crops on a small area, but to prevent the check in growth of a large area, the watered section showing a definite benefit from these applications. A comparison, which illustrates the value of water, is afforded by a 25 months old standover second ratoon crop of P.O.J. 2878, watered once, which produced 34·5 tons per acre as against 23 tons per acre from similar unwatered cane, with the c.c.s. in favour of the former.

During the 1938 season a 12 months plant crop of P.O.J. 2878 harvested 50·8 tons per acre with c.c.s. of 14·8, and 12 months first ratoon P.O.J. 2878 gave 45·6 tons per acre at 15·5 c.c.s. Although weather conditions for the past 18 months of the plant's operation have been the best experienced for some years, the increase from irrigation is definitely apparent.

FIG. 6.—Showing the supply from the 4-inch 4-stage pump discharging into the storage dam located on the highest ridge of the farm.

Now that definite production limits have been placed on the sugar industry, with the probability of farm peaks, intensive cultivation of cane on reduced acreages, and a long range agricultural rotation suggest themselves as a natural and logical consequence. It is here that the farmer with irrigation can control his production irrespective of seasonal conditions; he may devote portion of his land to alternative crops, or at least give his blocks, in turn, a rest under long fallow, aided by leguminous cover crops.

Maryborough Quarantine Area.

The Director would draw the attention of canegrowers to the fact that Proclamation No. 6 of the Sugar Experiment Stations Acts places restrictions on the removal of sugar-cane in the Maryborough district. The Proclamation provides that no sugar-cane which is to be used for the purpose of planting may be removed from any farm situated within the parishes of Maryborough, Tinana, Bidwell, Walliebum, and Young, unless a written permit is first granted by an inspector. That is to say, no farmer in the above parishes is allowed to sell or give plants to any person unless a written permit is first secured. If a farmer within this area desires to move sugar-cane plants from his farm he should make early application to the Director, Bureau of Sugar Experiment Stations, Brisbane.

H.W.K.

A Disc Sharpening Outfit: Description and Plans.

By D. L. McBryde.

ORDINARILY, the sharpening of plow discs is a job for skilled labour, and for this reason, the vast majority of farmers have to send their dull discs away to their local blacksmith or mechanic, when they are no longer sharp enough to give reasonably good work. In fact, because of the trouble, delay, and expense discs are kept in operation much longer than is good for the quality of the plowing, and standards of cultivation fall away as a consequence.

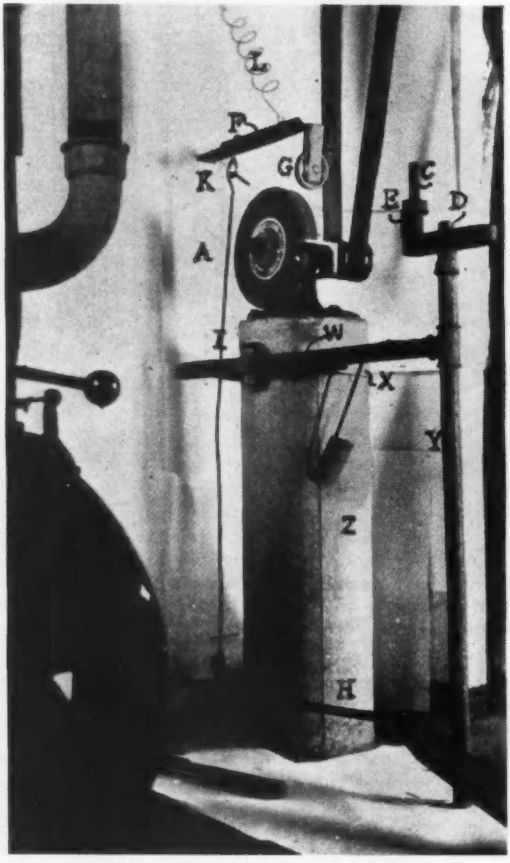

Fig. 7.—Illustrating the disc-grinding fitting, showing the complete assembly.

Some years ago, the writer devised a layout whereby disc sharpening became a simple operation, and, provided certain precautions were

taken by the operator, there was not any damage done through loss of temper of the sharpened discs. This apparatus could be installed easily and cheaply by any practical farmer, to be driven by his stable engine.

The efficiency of the layout is dependent upon three main points:—

Firstly, a disc pivot-pin which is readily adjustable to suit the particular diameter of the disc to be ground; *secondly*, the pivot-pin should also be readily adjustable so that the disc height may be made to suit the disc being ground; and *thirdly*, an easy method of applying pressure of the disc upon the stone to suit the nature of the work being done.

The accompanying photographs (Figs. 7 and 8) illustrate the apparatus erected at the Mackay Experiment Station, and plans (Figs. 9-12) show the details of the manner in which various parts of the apparatus are built into the assembly. In the plans the parts are as follows:—

A Emery wheel.
B Plow disc (in position for grinding).
C Pivot-pin (shown in detail in Fig. 9).
D Pivot-pin adjusting bolt and nut.
E Height-adjusting rings or washers.
F Upper pressure regulating arm.
G Pressure regulating wheel.
H Lower pressure regulating arm, or pedal.
I Rod connecting pressure arms *F* and *H*.
K Hinges of arms *F* and *H*.
L Recoil spring, lifting arm *F*.
M Wall stud or post.

The emery-stone at the station is placed in a position where the disc-grinding fitting would be in the road of traffic if it were to be permanently fixed in the position shown in the illustrations. So that it may be moved out of the way when not in use the pivot-pin is mounted on a frame of 1 inch water pipe, and this frame is clamped to the foundation column of the stone. When not in use, the frame (*Y*, Figs. 7 and 8) is released by slackening the long-threaded bolt on strap *X* when it may be swung away to a position at right angles to that illustrated, against the shed wall.

Where the fittings would be an obstruction, the pivot-pin could best be attached to the top of a post sunk in the ground in front of the stone, and the pressure regulating arms (*F* and *H*) could easily be hinged to another post at the back of the stone.

The recoil spring should be powerful enough to pull the pressure arms up several inches from the working position, but not so strong that undue weight is needed on the pedal *H* to bring the pressure wheel *G* into operation while grinding discs.

To set up a disc for grinding, first slacken the pivot-pin bolt *D*. Place the disc on the pin, and move the pin towards or from the stone until the rim of the stone is against the rim of the disc, and their positions show that the resulting bevel edge would be as required. If any

difficulty is experienced in getting a correct bevel, adjust the height of the disc upon the pivot-pin by taking off, or putting on, one or more rings, or washers, *E*. Thus, by varying radius and/or height adjustments, the angle at which the disc makes contact with the stone may be varied to give a wide range of bevelling to the sharpened edge, and a bevel to suit the work to which the disc will be put may be had. Later, some remarks on bevels for special jobs will be made.

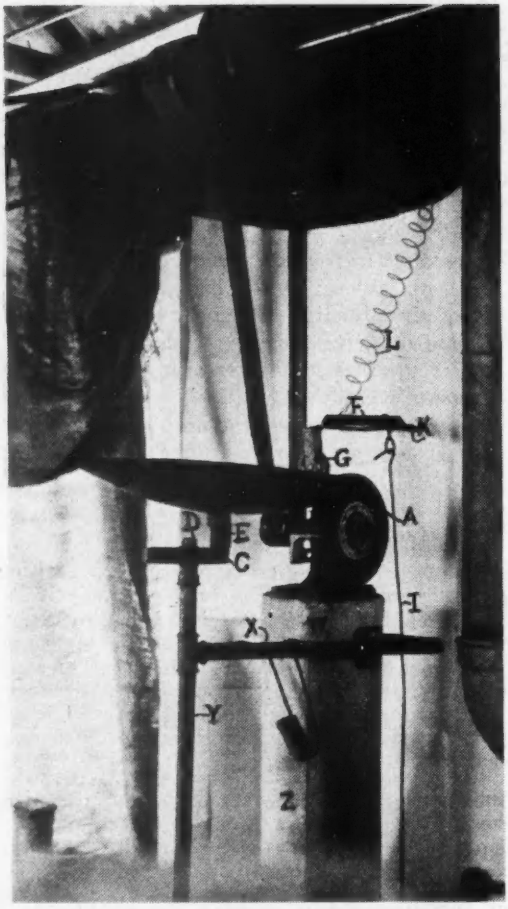

FIG. 8.—Showing the disc-grinding fitting, with the disc in position for sharpening.

When setting up a disc for grinding, it must be remembered that the disc falls towards the stone as the shoulder is ground away. Also, the friction of the stone tends to push the disc away from the stone. These two points should be allowed for when adjusting height and radius. The pivot-pin holding-down bolt *D* should be tightened before

commencing to grind. After these adjustments have been made the stone may be set in motion, but for the preliminary setting-up the stone should be idle.

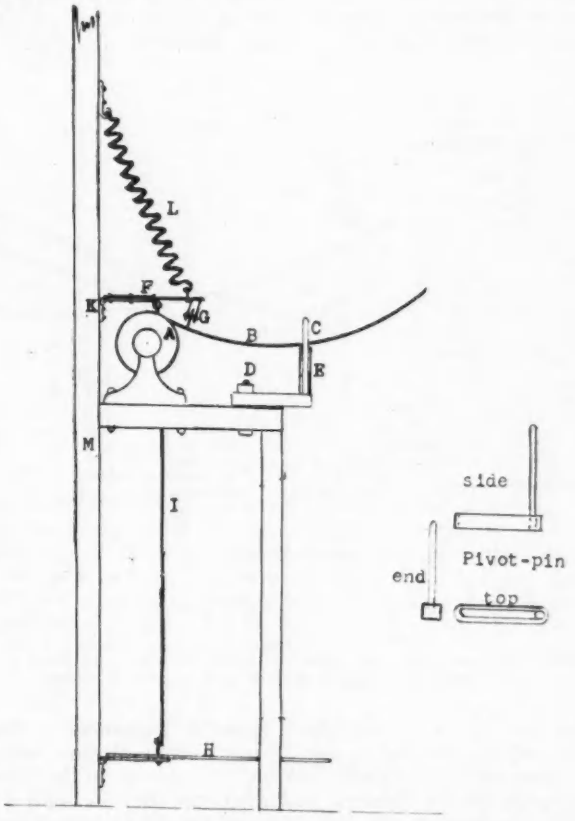

FIG. 9.—Drawing showing the essential features of the set-up.

The operator, who should wear a strong pair of gardening gloves for protection of his hands, holds the disc edge in both hands and imparts a continuously revolving motion to the disc, and at the same time presses on the pedal with one foot, thus causing the disc to be pressed against the stone. It is very important to keep a constant movement of the disc, more especially as the grinding is nearing a finish and the edge of the disc gets thin. If the disc remains stationary for even a second or two, hot spots will be formed on the edge, and the temper of the metal will thus be spoiled. After a few revolutions of the disc, it is advisable to examine the angle of the cut and see that it is as desired.

When grinding very dull discs heavier pressure may be placed on the disc, but the entire rim of the disc will soon become heated to an extent which causes discomfort to the hands. In such cases, grinding

should be stopped before serious heating occurs, and the disc should be allowed to cool, or be cooled by pouring water along its edge. In cases of badly worn discs it is necessary to readjust the pivot-pin, by bringing it closer to the stone, when grinding is partly completed, and this may be done while a stop is made to cool the disc. Light grinding pressure is recommended when nearing the finish of a disc.

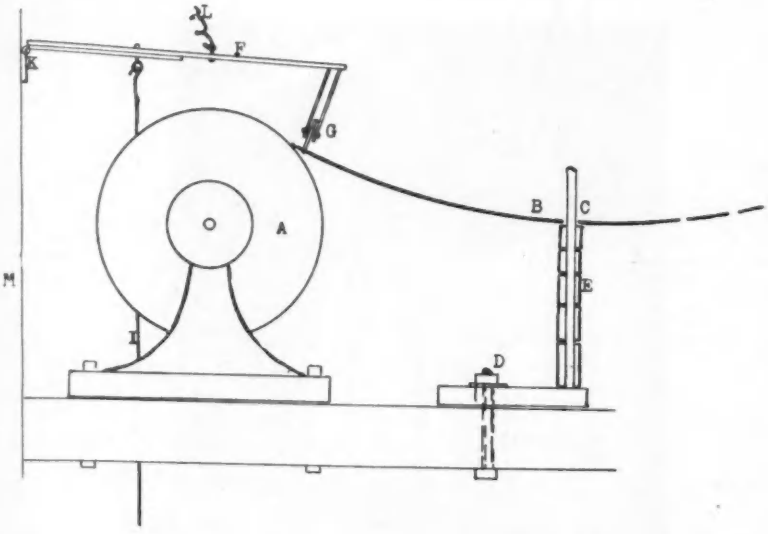

Fig. 10.—Illustrating the manner in which the disc is adjusted to give the correct angle of contact with the emery wheel.

Some discs are of metal which forms a "wire-edge"; that is, the edge does not grind cleanly, but forms a thin filament which turns inwards, away from the stone. When this occurs, it is best to cease grinding when almost finished, and then rub the disc with a fine file, placing the file flatly on the inner face of the disc whilst filing. When the wire-edge has been removed, grinding may be completed.

Discs which have been badly neglected or are very badly worn, will generally develop a shoulder on each side of the disc. A definite shoulder on the inner face is a serious fault, and should be corrected by hammering. The disc should be ground until the outer shoulder is removed completely. Place the disc on an anvil, or solid block, as shown in Fig. 11, so that the extreme edge of the newly-ground face touches the anvil, but with the inner edge slightly off the anvil. Hammer the disc at a slight distance back from the edge (at *X* in Fig. 11) and keep turning the disc while hammering. If there is a serious error to correct it is better to make several revolutions of the disc, hammering out a little more at each turn, than to hammer heavily with the object of taking out the entire shoulder in one turn. In fact, to attempt to take out a bad shoulder by hammering heavily may cause the edge of a hard disc to chip or crack, more especially if done during cool weather

when the disc is cold. Under cold conditions it is recommended that the disc be warmed up to a temperature which is uncomfortable to the touch, but which does not burn the skin, before hammering is done. A better and quicker job will thus be effected, and there will be no risk of damage to the disc. Dents in the rim of a disc should be hammered out before sharpening.

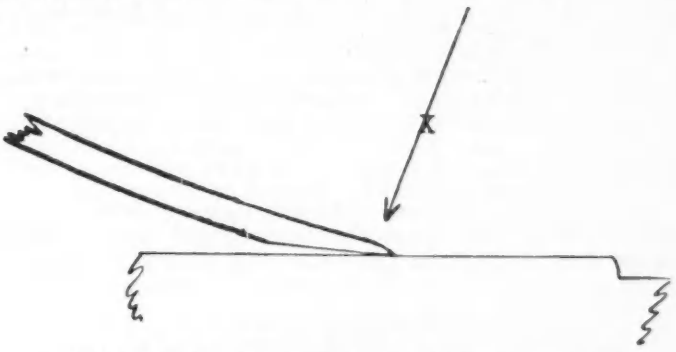

FIG. 11.—Showing the method employed for beating out the disc shoulder on an anvil.

As regards bevels, it may be stated that the best bevel is a long, narrow one, but while this is true in theory, it is often preferable to sacrifice something of the sharpness to obtain an edge which will last a longer period before requiring to be re-sharpened. In practice it is recommended that a wider or coarser bevel be made whenever the disc is to go into hard soil, and a really fine bevel be made for soft work only, and where the soil is free of stone.

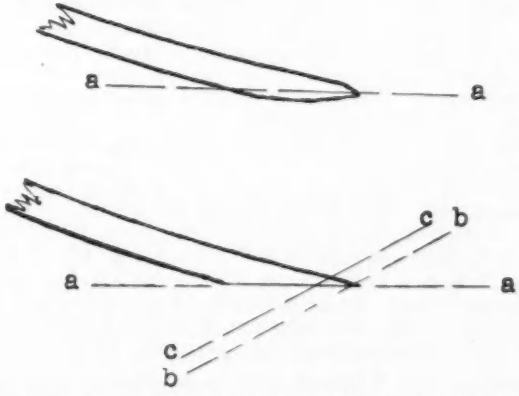

FIG. 12.—Illustrating a suitable bevel for the sharpened disc, and the method of re-sharpening as the edge becomes worn.

Fig. 12 depicts the section of a disc on which the edge has been worn, and line *a*—*a* represents what might be thought a satisfactory bevel for the finished, sharpened edge. Such an edge would be satisfactory under soft soil conditions, and if the soil were free of stones.

For hard working conditions, it is suggested that a final grinding be given after bevel *a—a* has been made. If a very light grinding is done to give a bevel as shown by the line *b—b* this will result in a keen, and much more lasting edge than the finer one. After some wear, another light grinding at say *c—c*, parallel to *b—b*, will re-sharpen the disc with only slight loss of metal, but the time will come when a shoulder of serious proportions will again develop, and further heavy sharpenings on the bevel *a—a* will be required.

The time taken to keep a disc in good condition is not very great, and will more than repay the grower by giving an improved standard of work from his plow. Also, a keen disc does not require the power for plowing at a given depth, and does not compact soil below the plowed depth, as does a dull disc.

The cost of an emery-stone, with single mounting, is about £3. With a light belt and a few fittings which are required to put in an outfit along the above lines, £4 should cover everything, and any grower who is handy will have little trouble in erecting it.

Action to be taken by Growers on whose Properties Fiji and Downy Mildew Diseases Occur.

It should be noted that certain obligations are now imposed upon canegrowers in the Bundaberg-Childers district on whose properties there occur outbreaks of downy mildew or Fiji diseases. The Director recommends that all farmers study these obligations in order to save themselves possible trouble at a later date.

Proclamation No. 5 under the Sugar Experiment Stations Acts requires that no sugar-cane or any part of a sugar-cane plant may be removed (except for the purposes of milling) from any farm or plantation on which Fiji or downy mildew diseases have existed during the previous three years. Obviously it will be an offence for a farmer to sell or give away cane plants of any variety if he has had either of these two diseases on that farm within three years of the date of the removal of the plants.

In addition this Proclamation directs that on farms or plantations where Fiji or downy mildew diseases have been present during the previous three years no sugar-cane of the varieties P.O.J. 2725, P.O.J. 2878, or P.O.J. 2883 may be grown beyond the third calendar year after the calendar year of planting. For example, on such farms or plantations any cane of these three varieties which was planted in 1936 cannot be further ratooned this year, and so on.

Proclamation No. 7 deals with outbreaks of Fiji and downy mildew diseases and directs that every occupier or owner of land must notify the Director or an inspector within forty-eight hours of its discovery of the presence of either Fiji or downy mildew disease on his land. It should particularly be noted, therefore, that **all growers on whose property either of these two diseases is now present, should notify the Director or an inspector forthwith.**

H.W.K.

A Mound-building Ant Affecting Sugar Cane.

By R. W. MUNGOMERY.

OCCASIONALLY after a period of minor activity, during which time certain pests cause little damage, they suddenly increase and assume pest proportions, over-running larger areas than those previously occupied by them, and they thus cause a certain amount of apprehension. These pest outbreaks are largely governed by varied weather conditions which intimately affect the insect itself, its parasites, or its environment.

This, in effect, is what has happened recently in the case of a mound-building ant which has, for a number of years, been regarded as a cane pest of rather limited activity. During the last year, however, it has caused some concern to growers in the Tully area, and to one or two growers at Mourilyan, and has necessitated control measures being instituted against it.

So far as is known, at least two very similar species of these mound-building ants exist in Queensland canefields, and similar damage occurs in such widely separated districts as Tully, Sarina, and Bundaberg.

The ants in question are medium sized, about one-fifth of an inch in length, and of a pale brownish colour. They live in underground nests, and their small entrance mounds are conspicuous around the base of affected cane stools, but the ants themselves are not so readily seen, since during the daytime they mostly skulk in their underground tunnels and their main mound-building activities are carried out during the night. Frequently a mound that has been destroyed during the day will have its entrance rebuilt during the following night, and the normal functions of the nest will proceed as before. These ants can be readily unearthed with a spade, and then they are seen in different parts of their underground communications.

The chief damage which these ants cause to the cane stools is a severe stunting, brought about by the enormous amount of tunnelling and honeycombing of the soil beneath the cane stool. This causes drying out of the soil, and in addition there is also a certain amount of mechanical injury sustained by the tiny root hairs, thus depriving the plant of a portion of its normal supply of plant foods and moisture. As far as we are aware these ants do not actually eat the root hairs—at least no root debris has been found whenever an examination has been made of their stomach contents. Rather do they colonise very small hoppers and aphids on the cane roots, and in return for this attention the aphids give off a honey dew which is eagerly sought after by the ants, and this appears to be the real reason why these ants construct their nests underneath the cane stools.

Similar mound-building activities are to be seen on some of the uncultivated lands, and exactly the same state of affairs occurs there with the one exception that in this case the aphids colonise on blady grass roots, &c., and it is from these uncultivated lands that the pest frequently makes inroads into the adjacent canefields, and once established there causes the grower considerable embarrassment.

Where these waste lands are extensive, the pest obviously cannot be economicaly eradicated from those areas, but an attempt can be made to keep the cane lands as free as possible. This should begin when the ratoons are ploughed out. Care should be taken not to leave volunteer stools or grasses grow on the ploughed-out fields. Otherwise these become hosts for the aphids and hoppers, with the consequent persistence of the ant pest.

The aim should be either to bare fallow the land, or else it should be sown heavily with a suitable leguminous crop, capable of growing quickly and choking out any foreign weed or grass growth. Later when this crop is ploughed under, the area should be looked over carefully to make sure that no ants' nests remain, and if they do, the ant colonies should be further harassed either by ploughing or by fumigation.

When the ants commence to invade young plant cane or ratoons recourse must then be had to the use of soil fumigants, and in this respect carbon bisulphide, or a mixture of carbon bisulphide and paradichlorbenzene, such as is used for the fumigation of cane crubs. will probably be found the most useful. Since the mounds vary so much in size and depth, the amount of fumigant to be used will necessarily vary considerably, but as the infested stools are mostly honeycombed underneath, they should be fumigated much in the same manner as when fumigating cane grubs, i.e., injections with a Dank's injector using the full charge, and approximately 15 inches apart. Preferably the injections should be made deep. In the case of ants inhabiting large nests with deep ramifications, these are not always destroyed in the first injection, and whenever this happens the survivors will have dumped their dead outside the mound entrance. In such a case it will be necessary to repeat the fumigation.

Cane Disease Control Boards.

By H. W. KERR.

IN certain of the major cane-growing areas of the State, the existence of cane diseases constitutes a definite menace to the well-being of the industry. While the Bureau is able to give a certain amount of local publicity to occurrences of this kind, and to assist interested growers in bringing the position under control, the magnitude and urgency of the problem cannot be dealt with effectively by these means. The situation calls for more intensive action on the part of the district concerned, in a manner similar to that which prompted the creation of Cane Pests Destruction Boards in 1924.

The Sugar Experiment Stations Amending Act of 1938 was, therefore, extended to make provision for the declaration of disease-infested areas, and the creation of Cane Disease Control Boards, which will be charged with the responsibility of taking all necessary steps for the prevention and spread of disease in the area as defined. Each Board comprises two millers' and three growers' representatives, and the costs of the operations of the board are met by a levy on all cane supplied to the mill or mills in the area. This levy is borne equally by miller and grower.

It may truthfully be stated that no mill area in Queensland is free from all cane diseases; but in most of these there is a balance between the incidence of the diseases in question and the major varieties grown therein, so that unless some new factor enters (such as planting a more susceptible variety or the introduction of a new disease), the balance is not likely to be upset. In such areas it is not proposed to create control boards. These will be confined, for the present, to those districts where the position is acute and demands immediate action.

The areas declared to date, and the personnel of the newly-constituted Boards are—

Mulgrave—

Mr. S. H. Warner (*Chairman*), Mr. H. N. Fell (*Secretary*), Mr. C. H. Crossland, Mr. M. A. Doolan, Mr. M. C. Graham, Mr. W. C. Griffin.

Mackay (Farleigh, Cattle Creek, Marian, North Eton, Pleystowe, and Racecourse Mill Areas)—

Mr. F. H. Stevens (*Chairman*), Mr. W. Knobel (*Secretary*), Mr. J. C. Collier, Mr. P. H. McLean, Mr. R. I. Robinson, Mr. T. W. Soper, Senr.

Bundaberg—

Mr. W. G. Batchler (*Chairman*), Mr. F. J. Wheeler (*Secretary*), Mr. B. A. Bourke, Mr. W. Grimes, Mr. G. C. Maughan, Mr. H. J. E. Pohlman.

Isis—

Mr. A. Adie (*Chairman*), Mr. F. W. Ellwood (*Secretary*), Mr. J. Alison, Mr. W. A. Brand, Mr. J. W. Clayton, Mr. W. M. Duncan.

Maryborough—

Mr. T. Braddock (*Chairman*), Mr. A. W. Macpherson (*Secretary*), Mr. C. J. Briggs, Mr. W. C. F. Cowan, Mr. A. W. Messer, Mr. C. J. Wood.

Moreton—

Mr. E. J. Blanch (*Chairman*), Mr. A. V. Thorp (*Secretary*), Mr. A. W. Elliott, Mr. W. Kittle, Mr. D. McDonald.

The major diseases with which the respective Boards will concern themselves are:—Gumming and downy mildew in the Mulgrave area, downy mildew in the Mackay district, and Fiji disease in all Southern districts, with downy mildew disease also in the Bundaberg district.

It is pleasing to record that all Boards are approaching the problem in a spirit which suggests that a very definite improvement in the existing position will be accomplished during the ensuing year. Steps are being (or have been) taken to appoint officers whose duty it will be to carry out the policy laid down by the respective Boards. Such line of attack has generally been formulated in consultation with the Bureau officers, and is calculated to provide the maximum of lasting benefit at a minimum of cost to the industry.

Canegrowers in these areas are urged to afford their Board every assistance and encouragement in the discharge of its functions. After all, everybody would be happy if losses from disease could be entirely

wiped out; and every shilling wisely spent this year will save a pound a year later. Already we have the evidence of what voluntary Boards in the Bundaberg and Isis areas were able to accomplish last year, and a continuance of such activities will definitely place those areas in an immeasurably better position a year hence.

The Bureau, for its part, is attempting to do all it can to breed or import varieties of high commercial value combined with resistance to the diseases of the major areas. This must always constitute the most effective means of controlling diseases. But the accomplishment of the task is not always simple, and every effort must be made by growers to retain their present standard canes until suitable substitutes are forthcoming.

Conference of Cane Pests Boards.

The Fifth Annual Conference of Cane Pests Boards was held in the board room of the Mackay District Cane Growers' Executive on Friday, 10th June.

On behalf of the Minister for Agriculture and the Advisory Board of the Bureau of Sugar Experiment Stations, Mr. A. F. Bell, Assistant Director of the Bureau, welcomed the delegates and expressed pleasure at the sustained interest in these conferences, which had been inaugurated in Townsville in 1935.

The following delegates attended on behalf of their respective boards:—Messrs. W. C. Griffin and M. A. Doolan (Mulgrave), C. L. Richardson (Hambledon), K. W. Maclean (Goondi), G. Wilson and W. J. Henderson (South Johnstone), E. H. Fox and J. W. Horsford (Mourilyan), K. R. Gard and H. Smith (Macknade), E. D. Row and D. G. Smith (Victoria), H. F. Hecht (Ingham Line), C. R. Crofton (Giru), M. T. Norris (Pioneer), A. H. Nuttall (Kalamia), H. J. M. Ramsden and G. R. Barton (Inkerman), J. J. Hedrick, R. I. Robinson, R. Clarke, A. S. Hamilton, and C. H. McGinn (Mackay), J. C. Nicholson and R. McKie (Plane Creek), A. F. Bell, R. W. Mungomery, W. A. McDougall, D. L. McBryde, and S. O. Skinner (Bureau representatives). Mr. F. C. P. Curlewis, general secretary of the A.S.P.A., also attended the conference as a visitor.

Mr. J. J. Hedrick, chairman of the Mackay Cane Pests Board, was elected chairman of the conference, and expressed his pleasure at the holding of this conference in Mackay.

During the course of proceedings some twelve short papers were presented by individual delegates and discussed by conference.

The conference took a serious view of the danger of the introduction of new insect pests of sugar-cane from abroad, particularly under the influence of aeroplane transport, and adopted a motion asking that representations be made to the Commonwealth Government urging the creation of a modern plant quarantine service.

Great interest was aroused by the demonstration of two new types of injectors for cane grub fumigation. The spears used in both appear to possess decided advantages over the old type and their further development will be watched with great interest. The modified injectors make for much greater ease of injection, and appear to speed up operations very considerably.

Mr. McDougall dealt at some length with the problems of grub control in the Mackay district, and gave instances of fields which, when fumigated early in the season, furnished excellent examples of successful and cheap fumigation. Owing to continued wet weather, however, most of the fields had been fumigated late, with resultant decreased efficiency and increased costs. He strongly advocated the necessary organisation to complete all fumigation early in the season.

Possible economies in the manufacture of rat baits were discussed on the basis of a paper submitted by Mr. G. Wilson, and Mr. Wilson was asked to make further inquiries and submit a further report on the matter.

Mr. McDougall outlined the distribution of the various species of rats attacking cane in different types of localities in Queensland, and stressed the necessity for knowing just what species was responsible for damage in each case. He expressed the opinion that poisoning campaigns provided, at most, only temporary relief, and could not be expected to eliminate plagues of rats which would certainly eventuate when suitable climatic conditions were experienced. He mentioned the lines upon which he was making investigations, such as the possible protection of cane in plague years.

Mr. Buzacott detailed experiments which had been carried out to determine the value of trashing as a possible means of borer control. His experiments showed that continuous trashing through the life of the cane did serve to reduce borer infestation, but that the operation was uneconomic. Trashing of cane a month or so prior to the commencement of the crushing season was found to be useless.

Mr. Mungomery reported on an investigation which showed that the conservation of trash did not increase borer damage provided the cane was properly topped and no rotting cane left in the field.

A study of the habits of giant toads carried out at Meringa showed that they were definitely eating large numbers of cane pests. Small toads were systematically fed to fowls and large toads kept in the fowls' drinking water, but in neither case did the fowls suffer any ill-effects. It was evident, therefore, that toads constitute no danger whatever to fowls.

Delegates were very interested in a demonstration with an electric fencer given by Mr. Mungomery. This apparatus gives animals a sharp but harmless shock when they touch it, and it is intended to test its possibilities as a deterrent to wallabies.

Before conference adjourned Mr. Bell answered a number of questions regarding the amended Sugar Experiment Stations Act, and explained a number of the provisions of the Act.

It was resolved to hold the 1940 conference in Ayr.

Annual Field Day at Mackay Sugar Experiment Station.

THE annual Field Day for canegrowers was held on Saturday afternoon, June 10th, at the Experiment Station at Mackay, where over 200 growers attended to listen to interesting addresses and to watch informative demonstrations. Bureau officials present included the Director (Dr. H. W. Kerr), the Assistant Director (Mr. A. F. Bell), the officer-in-charge of the Station (Mr. D. L. McBryde), and the Station entomologist (Mr. W. A. McDougall).

In addition to canegrowers from all parts of the district, the gathering included visitors from Mackay and other parts of the State, among whom were the southern growers' representative on the Advisory Board (Mr. C. W. Thiele), the general secretary of the Australian Sugar Producers' Association (Mr. F. C. P. Curlewis), and the veterinary officer stationed at Rockhampton (Mr. Marshall R. Irving).

The function opened at the rear of the laboratory building, where Dr. Kerr welcomed both growers and visitors.

"We feel it is good for us all to have this yearly opportunity of getting together, so that you may see what we are attempting to do on our station," he said, "and that we may, by an exchange of views, learn what you are thinking, and the nature of the problems that are troubling you. We do not pretend to show you anything of a spectacular nature. The work of the Experiment Stations is evolutionary rather than revolutionary, and we attempt merely to report to you progress along the lines of a policy which has been formulated, we trust, in the best interests of growers of the Mackay district. True agricultural investigators are themselves anything but spectacular individuals; few monuments are erected to their memory, but it has been said in all truth that the man who can make two blades of grass grow where only one grew before is a true benefactor of mankind.

"Since our last meeting, changes of vital moment to the sugar industry have been brought about, and we have now reached a stage where production control is definitely imposed on each area. It is not within my province to offer any comment on the manner in which the revised sugar allotments have been reached; but from the comment I hear, it would appear that the growers of this area have not received altogether unfavourable treatment. But even here we must recognise that the new order introduces the necessity for readjustment of outlook, which may bring in its train far-reaching influences on agricultural methods and policy. It is generally conceded that some form of peak quota for individual farms is inevitable if the control plan is to be fully consummated. Each grower would then wish to assure himself that he can produce his fixed allotment each year; moreover he will want to guard against highly excessive production in one year, due to a favourable season, and a deficiency in the next because of the insufficiency of the area under crop.

"For those few farmers who are fortunate to command irrigation facilities for their aid, the problem is reasonably simple of solution. But growers generally, who are at the mercy of the seasons must adopt some such expedient as has been found to operate fairly satisfactorily in the southern areas of the State—the growing of at least a proportion of cane that will standover successfully. It is often stated that conditions in this district are altogether unfavourable for the growth of standover cane; but we do not agree that this is necessarily so. Under even more trying conditions in parts of Hawaii, two-year-old crops are produced successfully—indeed, it is their standard practice. But it is not done with low-fibred, soft-rinded canes such as many of those grown in your area at present. We know from our own experience that there are drought-resistant varieties, sufficiently hard in the rind to withstand pest damage, and which will not rot if they become lodged, that produce good standover crops, which are, moreover, at an advanced state of maturity as early as June. Indeed, such crops fulfil a twofold purpose—lasting quality combined with early maturity.

"It is not suggested that the adoption of the policy proposed will not introduce difficulties, but we feel that growers will learn that by careful application, this will not prove the insurmountable hurdle which many think. For our part we are attempting to produce seedling canes that will measure up to the requirements of such a policy. To-day you will have the opportunity of seeing for yourselves just how much progress we have made in this direction. At the present time quite a few promising varieties are undergoing preliminary trial on the station, and such of these as measure up to our standards will be transferred to farm trials, on all classes of soils, to test their commercial value under normal farming conditions. This year we are arranging for the distribution of the variety Q. 20, which, though not a cane of highly outstanding qualities, does possess some virtues which warrant its release to Mackay farmers generally. Above all, it is highly resistant to the major disease of the area—downy mildew—on which the Assistant Director (Mr. Bell) will address you. Without anticipating what he has to tell you, I would point out that the existence of diseases renders the cane breeding project much more difficult than it would otherwise be, for in addition to growth, vigor, and high sugar content, our new canes must attain a high degree of disease resistance or they cannot be approved for planting. Already our best seedling has been withdrawn, at least temporarily, due to its susceptibility to downy mildew.

"There is one further phase of the changed order of production which I would like to stress also at this time. Most canegrowers have come to recognise, during the past ten years, the value of improved agricultural methods in their influence on the costs of production. Better tillage methods, green manuring, and the judicious use of the correct kinds of fertilizer in adequate amounts, have gradually improved yields per acre: so that since 1928, an increase in the total Queensland sugar crop of some 50 per cent. has been attended by an increase in area harvested of only 15 per cent. I regard this phase of development as one of the most encouraging signs that our farmers are adopting those principles which make for more profitable crops, while maintaining the productive capacity of the land. But there exists the grave

danger that many farmers will now suffer a reaction which may cause them to decide upon a policy of drastically curtailing all expenditure, in an attempt to show a better margin between costs and returns.

"While we applaud and encourage any sound efforts which are made along lines of economy we would counsel caution in discriminating between what is wise and what is unwise expenditure. For example, the farmer may decide to restrict or even eliminate fertilizer purchases entirely, and try to make up any crop deficiency by increasing the area cultivated. Such a plan would, we feel, very quickly lead to a situation of bankruptcy for both farm and farmer. If, on the other hand, the grower should decide to embark on a system of intensified production by the use of all means at his command, and to treat the land which would thus be thrown out of production to a long fallow under leguminous crops, he would find that the net result will be a substantial saving in expenditure on manures, due to the fertility-building influence of the long fallow, coupled with a marked progressive improvement in the quality of his production.

"Unfortunately, time does not permit of our discussing that important subject in greater detail at this juncture. But we would urge canegrowers to give to this question the thought which its importance demands. The Bureau has foreseen such a situation as has now come upon us, and has devoted considerable attention to the question of reliable legumes for long fallow, as well as the possibilities of deriving, also, some revenue from the land while fallowing.

"You have recently read something of a new leguminous species which we have called, for simplicity, Gambia pea. It is related to the familiar "rattle-pod," but in habit of growth it resembles a giant lucerne plant. In trial plantings during the past summer in all areas from Cairns to Nambour, it has shown very definite promise; yields of green matter to the acre have ranged from 23 to 28 tons, while it has shown a growth period of at least five months before seeding. Moreover, if cut at the right period of growth, it produces a successful ratoon crop, without the necessity for reseeding the field. It is also highly drought resistant. Analysis shows that a crop such as this will add to the land nitrogen equivalent to over one-half a ton of sulphate of ammonia to the acre. I need not stress the value of such treatment in its influence on the humus and fertility content of the soil. Moreover, it is certain that the plant crop of cane produced thereafter will demand the addition of little, if any, artificial manure to assure a maximum yield.

"On poorer lands, it may be found desirable to extend the fallow period to two years or even longer; the seeding of the paddock with a suitable grass, and allowing stock to graze thereon will allow the fertility-building process to continue, while a final short period green manure crop just prior to replanting the cane will complete an astonishing improvement in the magnitude and quality of the following cane crops.

"Many farmers are only now learning to appreciate the value of muds, ashes, and molasses as soil improvers of high quality; as these also contain the bulk of the soil plant food taken to the mill in the cane crop, it will be understood how much of the artificial manure now

purchased might be replaced by valuable substitutes obtained nearer home. Above all, I wish you to remember that profitable crops cannot be produced from infertile land; but the farmer should secure these benefits by the cheapest means at his disposal.

"I have mentioned, in passing, the desirability of devoting land when in fallow to some profitable use, such as the grazing of stock, to enable the farmer to derive income from the soil while resting from cane cropping. I know many will tell me that such a project is impracticable—that these lands are cane lands and nothing more. But surely we, as sugar producers, will not be so ready to acknowledge our inability to rise above the seemingly insurmountable obstacles that at present appear to obstruct any efforts to develop alternative crop production. I am confident that the future well-being of the sugar industry is intimately bound up with our ability to demonstrate that diversification of agriculture is not only possible, but essential for progress and development. I do not suggest that the problem is an easy one to solve; but we should remember that our industry has many times shown its ability to surmount what must have appeared difficulties of equal magnitude in the past. Will our efforts of the immediate future similarly demonstrate that out of adversity will arise an even greater era of stability and prosperity to all?"

Address of Advisory Board Representative.

The southern and central growers' representative on the Advisory Board (Mr. C. W. Thiele) congratulated the district on the interest shown by the growers in their own affairs and in the Bureau's efforts, as indicated by the large number present. This was in sharp contrast with a Field Day he had attended earlier in the week at Cairns, where there was a most meagre attendance, one-third of those present coming from Mossman and Innisfail. Such cases must be disheartening to the Director and his officers, who took such a lot of trouble in organising the functions. He added that he had just completed a tour of the sugar-producing areas of Queensland. Crops were looking splendid everywhere, but nowhere better than those in Mackay district. In the last few years a lot of improvements had been made in all the sugar districts due to the growers' own work guided by the efforts of Dr. Kerr and Bureau officers. However, there was room for still further improvement, and he hoped the Advisory Board would function better in the future. In passing he drew attention to the early issue of a handbook prepared recently by Dr. Kerr, containing many matters concerning disease, cultural methods, &c., which he commended to the attention of all growers, each of whom would receive a copy in due course.

Cane Disease Control.

The Assistant Director (Mr. A. F. Bell) addressed the gathering on cane disease control, as follows:—

"There are two points which call for special emphasis, namely, the necessity for a determined effort to bring about complete control of the one really serious disease present in this district and, secondly, the necessity for preventing the introduction of those serious diseases of which this district is fortunately free.

"In the first case I refer, of course, to the disease known as downy mildew. Perhaps some of you are becoming very tired of hearing of this disease; we certainly trust that before long everyone will become very tired of seeing it and dig out any diseased stools in sight.

"For the benefit of those growers who have never seen downy mildew we have provided some specimens which we trust such growers will examine closely, and put themselves in the position of being able to recognise if confronted with it in the future.

"Downy mildew is a fungus disease and takes its name from the fact that in warm weather there may usually be found a fine white down on the under surface of the leaves of diseased plants. Upon such leaves there are produced at night thousands and thousands of the microscopic spores or 'seeds' of the fungus. These are carried about by the air currents and are deposited on neighbouring plants and any spores which fall, or are washed down on to the tender buds or eyes of a cane stalk may germinate and set up an infection of a new plant. Fortunately for us these spores are very delicate and fragile; indeed their outside 'skin' is less than one twenty-five thousandth of an inch in thickness. Consequently they cannot withstand momentary exposure to sun or even the slightest drying effect. This, of course, serves to restrict the spread but under suitable conditions of rain or high humidity these spores can be carried alive by air currents up to a distance of about 200 yards. It will be appreciated then that any plant of a susceptible variety which is within 200 yards of even a single diseased stool is in a dangerous position.

"A consideration of these few simple facts will indicate one of the chief measures of control and that is, that all diseased plants should be found and destroyed in the spring, before wet weather and rising temperatures make it possible for spores to be produced and deposited on neighbouring healthy plants. This early destruction of diseased plants, together with care in plant selection, will go most of the way towards controlling downy mildew. We have stated that infection takes place through the buds on the stem of the cane; naturally no symptoms will be visible until such time as the disease has spread upwards through the stem and into the leaves. This may actually take months, and therefore any plant which has been exposed to infection with downy mildew is by no means to be regarded as disease-free merely because it looks healthy.

"Those of you who have seen a badly-diseased field of P.O.J. 2878 will appreciate just how rapidly this disease can spread and just how destructive it can be. There is no doubt that even if the planting of P.O.J. 213 and P.O.J. 2878 had not been disapproved, downy mildew would have wiped them out in a very few years. In the meantime, however, there would have been badly-diseased fields of P.O.J. canes scattered right through the district and neighbouring fields of the standard canes would have been absolutely bombarded with infection. Canes which are ordinarily resistant will succumb if they are continuously subjected to infection. Therefore the only rational thing to do was to protect such varieties by eliminating the very susceptible diseased varieties as quickly as possible.

"Another thing which must be watched is the planting of corn and some of the sorghums in the vicinity of sugar-cane. For years we have pointed out that it is dangerous to plant these crops near cane on account of the danger of spreading mosaic disease. We would now direct attention to the fact that they will also spread downy mildew disease, and if the district is to be completely freed of downy mildew the planting of corn, at least, will have to be suspended.

"This question of downy mildew will have to be taken seriously by you all, and the problem will have to be conscientiously tackled. Now that a Disease Control Board has been created in the district there is every reason to hope that, with the co-operation of the growers, the job will be done. This Board faces a responsibility which is greater than perhaps most of you realise. Downy mildew has already been responsible for the loss of P.O.J. 2878 over most of the district, and has prevented the release of a seedling which, on its Experiment Station performance, would be the best variety of the district. It should be possible to grow both these varieties, but a good job of disease eradication must be done first—otherwise it would be suicidal to release them when we know they would last a few years at most. Both these varieties are very strong rooting in character, and for the purposes of grub control a strong-rooting variety is what this district needs most.

"Turning now to our second point, that of the exclusion of diseases not present in this district. In our opinion downy mildew is undoubtedly the most serious disease of sugar-cane in Queensland, but running it a close second from your point of view is Fiji disease. As far as we know Fiji disease does not exist north of Bundaberg, but it is widely distributed in the districts of Bundaberg and south. Consequently if any grower surreptitiously brings in cane plants from the South there is an excellent chance that he will bring in Fiji disease. Of course, I know that no one would deliberately bring in diseased cane, but just as the road to hell is paved with good intentions so is the road to the canegrowers' ruin paved with inter-district exchange of cane which 'looks healthy.' I would remind you that every one of our diseases of sugar-cane was introduced into this country in the form of diseased cuttings of sugar-cane taken from plants which 'looked healthy.'

"I would further remind you that over 80 per cent. of your crop is grown from varieties which are highly susceptible to Fiji disease. It is obvious that there is trouble ahead if anyone introduces this disease. Under the Sugar Experiment Stations Act it is a serious offence for any person to bring cane into this district from south of Alligator Creek or from north of Bowen. It is also quite unnecessary for anyone to run the risks of contravening these sections of the Act as it can be left to the Bureau staff to introduce and test in the district any varieties received from overseas or promising seedlings raised at our other stations.

"Gumming disease and leaf-scald are not now known in this district, and so the same necessity for precautions exist as with Fiji disease.

"In conclusion, we would add a word of warning to those growers in the northern sections of the district where the growing of P.O.J. 2878 is still permitted. These northernmost areas, where grub damage is

worst, appear still to be free of downy mildew. In view of the marked grub-resistant character of P.O.J. 2878 we are hopeful that this variety can be saved to help these northern growers in their fight against the pest. It is therefore incumbent upon all concerned to see that no cane from outside areas is taken into this section, otherwise the risk of introducing downy mildew is great. Furthermore, the growing of corn and sorghum is to be condemned. It is to the advantage of the more southern growers also to keep the northern section of the district disease-free as, if and when, the present downy mildew situation of the Mackay district is cleaned up, the North Coast section will provide the necessary reservoir of plants for the reintroduction of P.O.J. 2878."

Parasites of the Horse.

Mr. Marshall R. Irving, of the Department of Agriculture, delivered a most interesting address on parasites of the horse, confining his remarks chiefly to worms and their control. Parasites, he said, caused considerable economic loss in animals as well as in agriculture. External kinds caused irritation, and inactivity, and acted as carriers of other diseases, in the same way as redwater was spread by the cattle tick. Further, the stable fly, the house fly, and the bush fly were all carriers of worms which affected the horse. On the other hand internal parasites caused lassitude, debility, loss of condition, anæmia, and general inability to perform tasks set. The control of parasites was of great concern to all who used horses as a method of traction on the farm. In any programme of control, however, it was necessary first to get the correct diagnosis, and to know something of the life habits and symptoms of the parasite concerned. Another important point was that in the actual treatment, the horse must be given a full dose. Most drugs were poisonous, and the indiscriminate balling of horses was therefore dangerous if drugs of unknown quantity and potency were used.

Continuing, Mr. Irving said that prevention of reinfestation also was most important. This involved hygiene and sanitation, and it needed a strict watch to see that all manure was removed from stables and other places. He said there were two main parasites in the Mackay district—horse bots and worms. Of the bots there were three main kinds, but while the throat bot was common here, the common bot was not found very often, and the nasal bot not at all. The adult throat bot lived for one to two weeks—as it has no way of assimilating food, it lived only until its bodily resources were used up. Contrary to the general theory the throat bot had no sting, but its unusual method of attack—sudden darts at the throat of the animal accompanied by a buzz not unlike that of a bee—caused fear, and could lead to serious trouble in certain circumstances. At each dart the bot laid two or three eggs in the hair on the horse's throat. These were hatched through the heat and sweat of the animal. The larvæ then entered the mouth through the lips, bored their way beneath the lining of the tongue and mouth, and after a time were swallowed. They then remained attached to the walls of the stomach in hundreds until the following spring and early summer, when they were expelled, and in time came out of the ground as new flies. During the time they remained in the stomach they secreted much toxin, and also removed digested food material and sucked blood. Carbon bisulphide was a good remedy to kill the larvæ in the stomach. In

assessing the dose, however, the weight of the horse had to be taken into consideration, the dose being 6 c.c. to each 250 lb. bodyweight. It was given in a gelatine capsule, by means of a balling gun or otherwise. The animal should be starved for twenty-four hours prior to being given the dose, and allowed to rest for twenty-four hours afterwards. Early winter was the best time of the year to give the dose, as at that period all the larvæ were already in the stomach, while further, the animal would then be in a better position to go through the winter as all the food it ate would go towards building up its body reserves.

The best method of control of the fly, Mr. Irving added, was by cutting away the hair on the throat of horses, as the bot would not lay eggs except on the hairs, and would lay nowhere else except on the throat. A good example of this was the cattle bot, which laid on the fetlocks of the animals. It was a common sight in the season to see dozens of bots flying round stock which were standing in water above the fetlocks. A bot also objected to going into shade, and a plentiful supply of shade trees would therefore lessen the incidence of the pest. The idea of placing a red ribbon under the neck of a horse was a fallacy, for the bot was no respecter of colour.

In regard to the common bot, Mr. Irving said this pest laid its eggs on the hair of a horse about the neck, shoulders, and front legs, and with the irritation set up, the horse took in the eggs through its mouth in the course of biting itself. A remedy to get rid of the eggs was to wipe the horse over frequently with a 2 per cent. carbolic acid solution, but any method of attempted control should be district-wide to give best results.

Speaking on the subject of worms, Mr. Irving said the most common was the hookworm, redworm, or blood-worm. The eggs were laid in manure, and the larvæ were taken into the stomach from the grass. The worm was 1 to 2 inches long, and was found in the large bowel. It caused anæmia and digestive disturbances by piercing the wall of the stomach, going into the bloodstream, affecting the liver and lungs, and coming up the windpipe to be swallowed again, to be taken eventually into the large intestine. Each worm consumed 1 c.c. of blood in twenty-four hours, and if 100 worms were present the loss of blood would be considerable each day. They caused severe debility and occasionally colic. Their activities also accounted for enlargements of the aorta, and had been known to cause a fracture of that blood vessel, with death following as a result of hæmorrhage. The treatment most favoured was oil of chenopodium, after starving the animal for twenty-four hours. Among other worms, tapeworms, and the large round worm (except in the case of foals) were not serious.

Continuing, Mr. Irving said another common variety was the human parasite of horses. Many people gave their horses mixtures that did more harm than good. If farmers' horses were affected, he advised them to consult the departmental officers, and they would be given the best-known remedies.

In answer to a question, Mr. Irving said true mange was uncommon in Queensland, but what was usually called mange was definitely not caused by the mange parasite. Mange was easy to treat, but the common

affliction of this State, which was now known as "Queensland Itch," had no known cure up to the present time. Its cause was constitutional, and it might be heredital. Horses so affected would clean up readily if removed to New South Wales.

Pamphlets on the subject of horse parasites were then distributed.

Subsequently Mr. Irving attracted a large number of farmers at the stables when he demonstrated an effective method of causing a horse to open its mouth ready for the ball, solely by doubling its tongue inside the mouth, with the hand. This method, he said, was absolutely painless and there was no danger whatsoever to the operator. He also showed those present the correct method of treating teeth, an operation which he said should be carried out every six months if the horse was to be kept in good health and to make the most use of its food.

Grubs and Wireworms.

The entomologist attached to the Mackay Station (Mr. W. A. McDougall) addressed growers as follows:—

"In the Mackay district some general interest is taken, at times, in the subject of 'grey-back' grub damage to cane and its control. Naturally these times coincide with years of severe losses such as during 1937, 1938, and again this year. Usually this pest confines its major activities to certain areas, e.g., Cameron's Pocket, Silent Grove, around Calen and Kolijo, Mount Jukes, in parts of the Farleigh areas, Mia Mia, Owen's Creek, Carmila, &c. In these 'grubby' localities the control of this pest is of more than passing interest; farmers concerned want their losses reduced as far as it is economically possible. Up till the beginning of this year the chief help given them has been beetle and grub collecting campaigns and the Bureau's effort to keep strong-rooting, disease-free varieties in most of the grub-infested areas.

"Available records indicate that collecting campaigns, recommended in the first place as a temporary measure, have been carried out continuously in the Mackay district for the past forty-three years. Over the last nine years nearly £12,000 has been absorbed by this work. Last year the annual conference of representatives of Pest Boards from Plane Creek to Mossman resolved 'that this conference is of the opinion that the collection of beetles is not economic.' Mackay is at present one of the very few sugar districts in the State where collecting of beetles is still practised. Obviously there are many farmers here with at least a generation of collectors behind them and probably only an impersonal interest in the control of grubs. However, there is a suffering minority. Some further effective help must be given these farmers—probably their need will be even greater if they have to farm under controlled crop production.

"With this object in view fumigation, a method of grub control which has given best economic results in North Queensland, was introduced to this district this year. Some 60 acres were treated under rather adverse weather conditions in four grubby areas. Experience elsewhere has shown that fumigation is not always successful if left completely in the hands of individual farmers. Its economic success

depends upon some organisation as well as technical detail. Working this year with poor organisation and in a district new to the work results were fairly satisfactory. Success attained was chiefly due to the enthusiasm and energy of the farmers selected for the pioneering effort. Under better general conditions these results can be improved upon. It is hoped that the chief value of this year's attempt at fumigation will be to impress upon those farmers who experience grub damage that, if used, where possible, fumigation as a supplement to the growing of strong-rooting varieties would be a distinct advance in the struggle against grub losses in the Mackay area.

"Returning for a few moments to the subject of last year's Field Day address, namely, the widely spread wireworm pest, this year it is expected that there will be no larger amount of wireworm damage in the district than during last year. The usual warning of watchfulness must be given. Some two years ago the Bureau and executive members of the local farmers' organisation discussed further possible work in connection with this pest. It was promised that, when possible, more investigational work would be undertaken, but it was pointed out that results would be very slow. This year a machine was built, and is on view, for the purpose of sieving wireworms from soil samples. Much of the work connected with this sieving is rather technical, and is directed towards a standard method of evaluating any controls which may be tried out in the future. Immediate practical results to be expected will be along the lines of improving on the method of using trial sets as an indication of probable wireworm infestations.

"In conclusion I would mention that there is on the station to-day an injector devised in the North that has great possibilities; it seems a distinct improvement on past efforts, and should be of interest to those concerned with grub damage."

Growers' Appreciation.

As chairman of the Mackay District Cane Growers' Executive, Mr. F. H. Stevens, expressed appreciation of the addresses given, particularly that of Mr. Irving, for he said it was rarely that growers had the opportunity of hearing such matters discussed so completely by a disinterested and independent party. He called on the chairman of the Queensland Cane Growers' Council (Mr. George Johnson) to move a vote of thanks to Dr. Kerr and the other speakers.

Mr. Johnson said he was pleased to see in the gathering Mr. Thiele, who had done so much towards organising the growers in the South, and he expressed appreciation of the work of the Bureau officers towards better methods of cultivation, and the eradication and prevention of diseases affecting the product of the growers of Queensland. No one in any country was more zealous in this regard than Dr. Kerr and Mr. Bell, and they were ably supported by more junior members of the Bureau staff. North Eton owed a particular debt of gratitude to the Bureau officers, inasmuch as a few short years ago it was in a state of stagnation, but with the help of the Bureau it was now in a flourishing condition. The growers of the area and the staff of the mill wished to make some tangible form of their appreciation, and a walking stick,

fashioned like a stick of cane, had been made by the chief engineer at the mill (Mr. Hugh McLennan), who made a hobby of this work, and the stick was to be presented to Dr. Kerr. He then made the presentation, and moved a vote of thanks to the speakers, asking Mr. F. C. P. Curlewis to support him.

Mr. Curlewis also spoke of the enthusiasm and competency of the Bureau staff, and said that the growers' appreciation of their work was shown in the large attendance. He also mentioned Mr. Thiele's great value to the sugar industry, the Bureau, and the Advisory Board.

Tour of Station.

At the conclusion of the addresses the growers were conducted on a tour of inspection of the station by Dr. Kerr, Mr. Bell, and Mr. McBryde. On the blocks of varietal trials it was stated that results were very promising in the case of varieties F. 18 and Comus, the latter a C.S.R. cane from New South Wales, both in regard to tonnages and sugar content. From the aspect of health the appearance of the cane left nothing to be desired, and in the case of the two seedlings mentioned a distinct advantage in their favour could be seen in comparison with the control plot of Q. 813.

Seedling plots also attracted considerable attention, and here the method of choosing the most promising over a period of years was explained.

The crop rotation blocks were inspected. Here, in the wettest land on the station, 16 acres are divided into 2-acre blocks, each of which grows two crops of cane in eight years. For the remaining six years each block is fallowed and planted to grasses, on which sheep are grazed to demonstrate this form of production as a likely sideline for cane-growers. Results so far achieved are most encouraging, and both animals and cane are in splendid condition.

At the stables the condition of the station horses was most favourably commented upon. Mr. McBryde here pointed out the importance of balancing the ration for working horses, with particular regard to protein content. He said the horses were fed with 18-20 lb. of chop chop, 2 lb. of molasses, and ¾ lb. of cottonseed meal each, per feed. The last-named constituent in the feed supplied the protein.

On their return to the station the growers' interest centred round a farm device for sharpening plough discs, constructed on the station, an electric fencer which carried a small though high-voltage current which was effective and yet harmless to animals and humans, and Mr. McDougall's wireworm sieve. Farmers from grub-infested areas inspected the new type of fumigator nozzle invented in the North, and which holds great promise in the future control of the pest.

Throughout the proceedings addresses and announcements were broadcast through a loud-speaking apparatus kindly arranged for by the Mackay District Cane Growers' Executive, and the service was greatly appreciated by those in attendance.

Standover Crops in the Burdekin District.

The production control quotas which have recently been introduced will force many areas to adopt the expedient of standing over a proportion of the crop from one season to another, if they would be assured always of reaching their annual quota. As the growing of standover crops is rather new to most farmers from Mackay north, careful forethought and planning will be necessary, so that they may avoid costly mistakes which are often made when such a policy is first adopted. In the Burdekin district the question was raised recently, and these suggestions are offered as a guide to farmers in those parts.

The first matter to be decided is that of cane variety. Doubtless Badila will prove best for that district. It would not be wise to upset the present system of April-May planting, harvesting the crop when 15-17 months old, and restricting standover cropping to ratoon blocks. The selection of the most suitable fields for the purpose will demand some care. The "poorest" cane crop is not the logical one to leave. Perhaps the one which is least advanced could be set aside for the purpose, but if a reasonable second year's growth is to be experienced, the crop must be in good condition, and capable of taking immediate advantage of any favourable circumstances it may encounter.

It would be a mistake to allow the standover crop to take its chances on the weather. Burdekin farmers have now learned how to produce good ratoons, and this is possible only where they are given liberal treatment in respect of both plantfood and water. The standover crop should likewise receive its share of irrigation water, and, if possible, a light top-dressing of sulphate of ammonia should be applied during the early summer months. This will assure a vigor of growth in the second growth season, and also serve to delay somewhat the maturing of the crop.

It is universal experience that standover crops are uniformly early maturing, almost irrespective of the variety. Standover Badila would probably be mature by June, or July at the latest, where a second season application of sulphate of ammonia is made. Where the mill has, say—25,000 tons of standover cane to deal with in any year, it would probably be necessary to commence crushing at such a period that all standover may be harvested *prior* to the normal commencement date for the mill. Thus if crushing usually commences about the 23rd June, the case in question would warrant the mill beginning about the 1st June. The early maturing character of two-year-old cane is a feature strongly in its favour. In the Burdekin area, Clark's Seedling is not altogether satisfactory as an early cane.

As an example of the possibilities of the above suggestions we might quote a block of standover ratoon Badila, which will be cut this year in the Pioneer area. A year ago it was estimated that the ratoons would yield 18 tons per acre: the farmer preferred to stand it over, and at the present time it is promising over 30 tons per acre. A small mill test made on a stick sample on the 1st June showed a C.C.S. of 15·5 per cent.

H.W.K.

Mulgrave Quarantine Area.

We wish to remind canegrowers in the Mulgrave mill area that the movement of cane plants is restricted by Proclamation No. 3, issued under the Sugar Experiment Stations Acts. This Proclamation sets out that owing to the presence of gumming disease it has been found necessary to prohibit the removal of sugar-cane from that portion of the Mulgrave mill area which lies within the parishes of Sophia, Grafton, and Trinity. The term sugar-cane includes any portion of the cane plant—roots, stem, or leaves—so that it is also an offence to remove cane-tops or cane grown for fodder purposes from that portion of the mill area.

These restrictions have been imposed for the purpose of preventing the spread of gumming disease into neighbouring mill areas, where farmers are growing a large proportion of susceptible varieties. It is, therefore, greatly to the interest of growers in the neighbouring districts to see that the conditions of this quarantine are rigidly observed. At the same time it should be pointed out that in the event of the removal of sugar-cane or any part of a sugar-cane plant from a quarantine area the following persons are guilty of an offence:—The person actually removing the sugar-cane, the grower from whose farm the cane was removed, and the grower to whose farm the cane is delivered.

A.F.B.

Prohibition of Introduction of Sugar Cane into the Isis District.

The Director of the Bureau of Sugar Experiment Stations desires to call the attention of all persons in the Bundaberg-Childers districts to important provisions which are contained in a Proclamation recently issued under the Sugar Experiment Stations Acts. Certain requirements of this Proclamation concern not only canegrowers but also dairy farmers, and, indeed, any person who is likely to move sugar-cane from one place to another.

Proclamation No. 4 prohibits the introduction of any sugar-cane, or any part of the sugar-cane plant, into that part of the Isis mill area lying within the parishes of Childers, Gregory, and Booyal, and that part of the Fairymead mill area lying within the parish of Gregory. An exception is made in the case of sugar-cane consigned to the Isis Central mill for the purpose of milling.

The Isis district is extremely fortunate inasmuch as downy mildew disease of sugar-cane has not yet been observed in that district, although the disease is present and spreading in the neighbouring Bundaberg district. The Java Wonder Cane, P.O.J. 2878, is highly susceptible to this disease, and its loss to the Isis district would be a very serious calamity. Downy mildew is much more difficult to control than Fiji disease, which is already in the Isis district, and every action should be taken to eliminate the possibility of an outbreak of downy mildew in this district.

H.W.K.

Corn, Downy Mildew and Cane.

BY ARTHUR F. BELL.

OFFICERS of the Bureau have at all times advised against the growing of corn in the vicinity of cane fields on account of the danger of increasing the spread of mosaic disease. This danger arises from the fact that mosaic disease is spread by a small insect, the corn aphis, which breeds prolifically on corn and sorghum, but does not breed on cane. Obviously, then, the growing of corn or sorghum near cane will breed a large stock of these aphids which migrate on to the cane and so spread the mosaic.

Recently there has become evident another and much stronger reason why corn should not be grown in the vicinity of cane, and this particularly applies to Southern Queensland at the present time. The sugar industry in Southern Queensland has been rehabilitated by the growth of varieties which are highly resistant to the once terrible scourge, gumming disease. It so happens that the two most important of these varieties, P.O.J. 2878 and P.O.J. 213, are highly susceptible to downy mildew, a disease which was almost non-existent in the southern districts at the time of their introduction.

Unfortunately the climatic conditions over the past three years have been eminently suited to the continued and late spread of downy mildew in the Bundaberg district, and we now must face the position where the continued cultivation of P.O.J. 213 and P.O.J. 2878 is seriously threatened, at least in the Woongarra area.

Scattered outbreaks of this disease occurred last year. In searching for the origin of these outbreaks it was found that in some cases they had obviously originated from a source of infection carried over in one of the old varieties; in other cases, however, there appeared to be no such source of infection. Closer examination then revealed the fact that near most of the latter fields we could find corn which appeared to be affected with a downy mildew disease.

We then carried out investigations of this aspect of the problem, and we have now found that corn is very easily infected with exactly the same downy mildew disease as cane and that cane can become infected from diseased corn. It might be mentioned here that on cane the spores or "seeds" of the fungus which causes downy mildew disease are produced only on the lower surface of the leaf, whereas on corn they are produced in vast numbers on both sides of the leaves. Because corn grows so much faster than cane the disease develops much more rapidly; a block of even a very susceptible variety of cane will normally take not less than a couple of years to become 100 per cent. infected, but corn becomes 100 per cent. infected in a few weeks.

Even if the corn were healthy when planted, it would still be very dangerous in the event of a single stool of diseased cane being near it. In the absence of corn the disease would gradually spread through the cane from this single stool, but by careful inspection and digging out of diseased stools as soon as they appeared the disease could be brought under control. It would be a different story if there were a block of corn alongside; this would become infected from the single stool of

diseased cane and the disease would go through it like wildfire. Then, instead of the cane being exposed to infection from one or two stools of cane, it would suddenly become exposed to infection from hundreds of stools of corn and the rate of spread in the cane would be greatly accelerated.

In view of these findings it appears necessary that steps will have to be taken to prohibit the growing of corn in cane areas and farmers would be well advised to seek some suitable alternative fodder crop. Our experience to date indicates that sorghums are much less susceptible to downy mildew than corn. In the coming season it is proposed to test the downy mildew resistance of a number of grain sorghums. Grain sorghums in the United States yield some remarkable results and leading varieties have recently been imported by the Queensland Department of Agriculture. Should these prove resistant to downy mildew they would make excellent substitutes for corn *in those areas where mosaic disease is not a problem.* Where mosaic disease is likely to be a serious problem, the growing of sorghum of any kind must be condemned, as it always has been.

"Sports" of the Sugar Cane Variety—Clark's Seedling.

The Director of the Bureau of Sugar Experiment Stations draws attention to the fact that there appears to be considerable doubt in the minds of canegrowers as to the approval or otherwise in their mill districts of some of the colour sports of Clark's Seedling. For the information of such growers it is stated that for the purposes of the Sugar Experiment Stations Act all sports of Clark's Seedling are regarded as being identical with the original variety. That is to say, the canes variously known as Benbow, P.Q. 1, Gaspari, and H.Q. 426, are all classed as Clark's Seedling. Therefore, in any mill district where Clark's Seedling is listed as an approved variety, it should be understood that this also includes approval of Benbow, P.Q. 1, Gaspari, and H.Q. 426. Conversely, if "Clark's Seedling" is not mentioned on the list, it means that this variety is disapproved for planting and that Benbow, P.Q. 1, Gaspari, and H.Q. 426 are also disapproved.

H.W.K.

DAVID WHYTE, Government Printer, Brisbane.